

Michael Laposata MD, PhD
Pathologist-in-chief
Vanderbilt University Hospital

DIAGNOSIS OF CHILD ABUSE

- **The medical literature contains many case reports in which child abuse was overdiagnosed in children with hemorrhagic coagulopathies**
- **A major concern is that overdiagnosis may be more common than is currently believed because of the high prevalence of von Willebrand's disease, which may be on the order of 1% in the general population**

SYMPTOMS THAT SUGGEST CHILD ABUSE AND NONINFLECTED ENTITIES THAT MIGHT CAUSE THEM

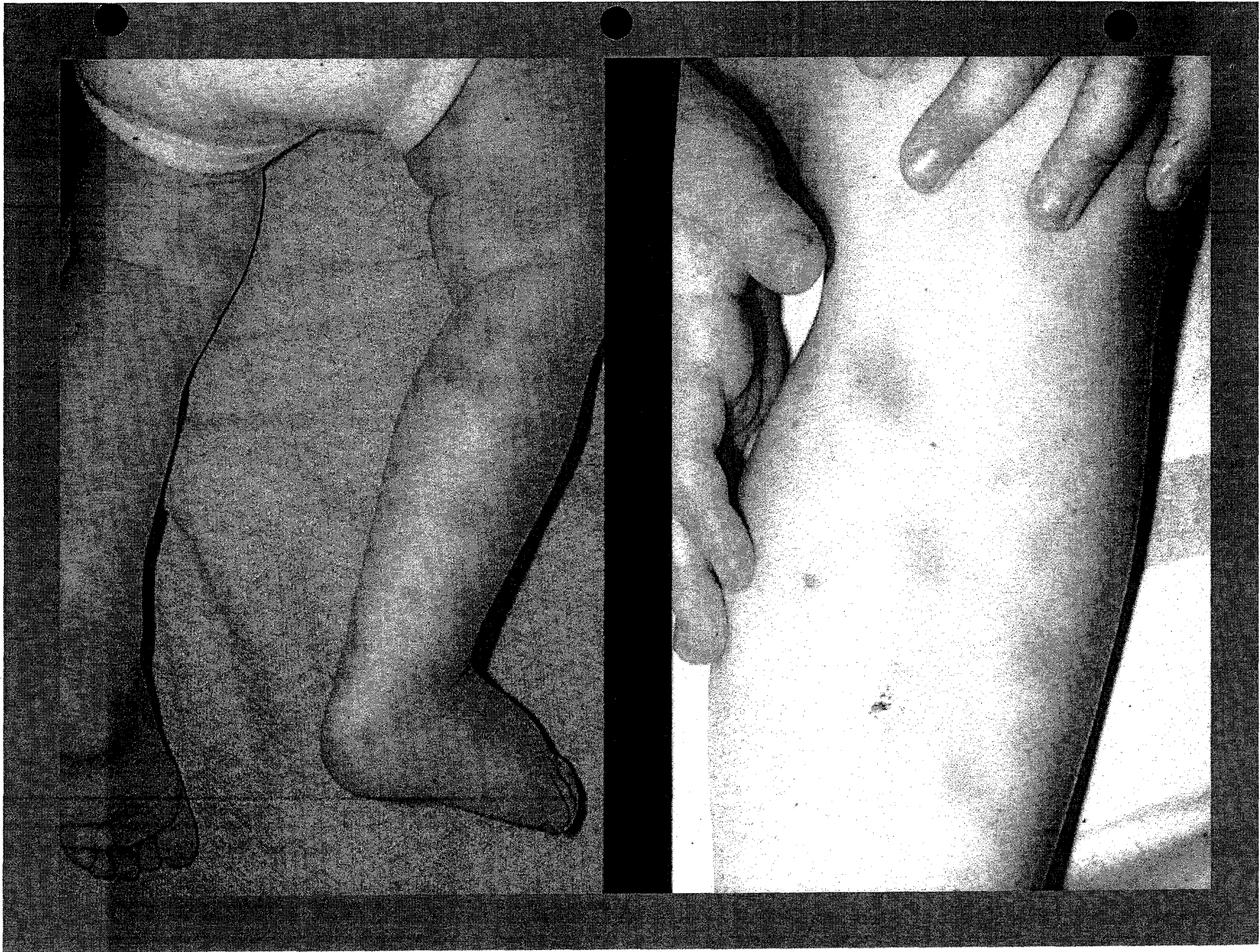
<u>Physical Symptom</u>	<u>Possible Noninflicted Cause</u>
Bruises	von Willebrand disease
	Hemophilia A and B
	Idiopathic thrombocytopenic purpura
	Thrombocytopenia with lymphoblastic leukemia
	Vitamin K deficiency
	Purpura fulminans
	Meningitis with disseminated intravascular coagulation
	Hemorrhagic disease of the newborn
	Henoch-Schönlein purpura
	Ruptured subarachnoid vascular formation
	Blue spots malformation

**COMPARISON SLIDES
OF CHILD ABUSE**

VS.

COAGULOPATHY –

**Which case is abuse and
which case is a child with
a bleeding disorder who
experienced a minor injury?**



DIAGNOSIS

Vascular Disorder

**Female - Age 10
Months**

**Extensive bruising on
legs due to Henoch-
Schönlein purpura**

Child Abuse

**Male - Age 4
Years**

**Cluster of roughly
circular bruises on the
inner aspect of the
lower leg from
grip marks**



DIAGNOSIS

Child Abuse

Male - Age 4 Years

**Unexplained black eyes and multiple burns
with swelling of the forehead and bilateral
peri-orbital hematoma**

Coagulopathy

Male - Age 5 Years

**Extensive large purple bruise in a well cared
for child with a diagnosis of idiopathic
thrombocytopenic purpura**

Physical Signs of Child Abuse, Saunders, p 92, p 105, 1996

Michael Laposata, M.D., Ph.D.

**Director of Clinical Laboratories
Massachusetts General Hospital
Professor, Harvard Medical School**

COAGULATION TESTS

☐ Platelet Specific PLA-1 Antigen (526)

☐ Platelet Factor 4 (504)

Protein C

☐ Activity (035) ☐ Antigen (036)

☐ Antigen/F VII Ratio (067)

☐ Protein C Inhibitor (PAI-3)* (717)

Protein S

☐ Activity (088)

☐ Antigen Total (038) ☐ Antigen Free (087)

☐ Antigen/F VII Ratio (059)

Protein C and S

☐ Activity (149) ☐ Antigen (142)

☐ Antigen/F VII Ratio (032)

☐ Activity and Antigen (204)

☐ Proconvertin Prothrombin Assay (084)

☐ Prothrombin Consumption (PF3) (503)

☐ Prothrombin Fragment 1+2 (718)

☐ Prothrombin Time (080)

☐ Prothrombin Time Mixing Study (116)

☐ Reptilase Time (610)

☐ Stypven Time (611)

☐ Thrombin Time (807)

☐ Thrombin Time Mixing Study (813)

☐ Thrombin-ATIII Complex (714)

☐ Thrombus Precursor Protein* (209)

☐ Tissue Factor Pathway Inhibitor Ag* (147)

☐ Tissue Plasminogen Act Antigen (125)

☐ Tissue Thromboplastin Inhibition (804)

von Willebrand Factor

☐ Activity (114) ☐ Antigen (113)

☐ Multimers (117)

- ☐ *F VIII Human (Bethesda) (701)*
- ☐ *F VIII Porcine Screen (703)*
- ☐ *F IX (Bethesda) (704)*
- ☐ **Fibrin Monomer (202)**
- Fibrinogen**
 - ☐ *Activity (200)* ☐ *Antigen (199)*
- ☐ **Fibrin(ogen) Degradation Products (201)**
- ☐ **Fibrinopeptide A (086)**
- Fletcher Factor**
 - ☐ *Prekallikrein Assay (121)*
 - ☐ *Prekallikrein Screen (120)*
- ☐ **Heparin Adsorption of Plasma (135)**
- Heparin Anti-Xa Assay**
 - ☐ *Unfractionated (600)*
 - ☐ *LMWH (602)*
- ☐ **Heparin Cofactor II* (133)**
- Heparin-Induced Antibody**
 - ☐ *Antibody* (522)* ☐ *Antibody Titer* (528)*
- ☐ **Heparin Solution Quantitation (139)**
- ☐ **Hexagonal Phospholipid Neut. (144)**
- ☐ **High Mol Wt Kininogen Assay (123)**
- ☐ **Homocysteine (Serum) (727)**
- ☐ **Homocysteine (Urine) (729)**
- ☐ **Kaolin Clotting Time (056)**
- ☐ **Lipoprotein(a)* (715)**
- ☐ **Plasminogen Activator Inhibitor-1 (126)**
- ☐ **Plasminogen Activator Inhibitor-2* (140)**
- ☐ **PIVKA-II* (726)**
- Plasminogen**
 - ☐ *Activity (400)* ☐ *Antigen (408)*
- ☐ **Platelet Neutralization Procedure (805)**
- Platelet Antibody**
 - ☐ *Direct (523)*
 - ☐ *Screen (520)* ☐ *Platelet Specific (524)*

☐ Activated Protein C Resistance (716)

☐ alpha-2-Antiplasmin Assay (039)

Anticardiolipin Antibody

☐ IgG, IgM (034) ☐ IgA (164)

☐ Antiphosphatidylserine (153)

Antithrombin

☐ Activity Plasma (030)

☐ Antigen Plasma (033)

☐ Activity Serum (031)

☐ APTT (040)

☐ APTT Mixing Study (806)

☐ beta-Thromboglobulin (085)

☐ C4b Binding Protein* (160)

☐ Cryofibrinogen (203)

D-Dimer

☐ Quantitative (405)

☐ Semiquantitative (404)

☐ Dilute Russell's Viper Venom Test (057)

☐ Euglobulin Lysis Time (401)

Factor Activities

☐ F II (100)

☐ F V (101)

☐ F X (105)

☐ F VII (102)

☐ F XI (106)

☐ F VIIa* (activated Factor VII) (111)

☐ F VIII (103)

☐ F XII (107)

☐ F IX (104)

☐ F XIII* (108)

Factor Antigens

☐ F VII* (112)

☐ F IX (205)

☐ F X* (206)

☐ Factor V Mutation (Leiden) (719)

☐ Factor VIII Concentrate Quantitation (058)

Factor Inactivators

☐ Inhibitor/Inactivator Screen (700)

☐ F V (Bethesda) (706)

☐ F VIII Porcine (Bethesda) (702)



1 Check in Box for Prolonged PTT Panel
Initiates Use of This Test Selection Algorithm

Prolonged PTT Evaluation

Degrade heparin in sample and repeat PTT -
if the PTT normalizes, heparin is the cause



PTT mixing study (1:1 mix of
patient:normal plasma)



PTT Normalizes



Factor deficiency-
measure factors VIII, IX,
XI, and XII



PTT remains prolonged



Inhibitor, most commonly Lupus anti-
coagulant; may be a Factor VIII inhibitor
if PTT mixing study first normalizes and
then becomes prolonged



Perform tests for specific inhibitors
suggested by results of PTT mixing study

MGH experience with detectable errors in test selection by clinicians

Test selection mistakes in coagulation by MGH and non-MGH clients in January 2003 are only 2-3 per week and include –

Ordering Factor V instead of APC resistance to screen for Factor V Leiden

Ordering Factor X instead of Anti-factor Xa or chromogenic Factor X

Ordering tests for both bleeding and thrombosis when only one condition is present

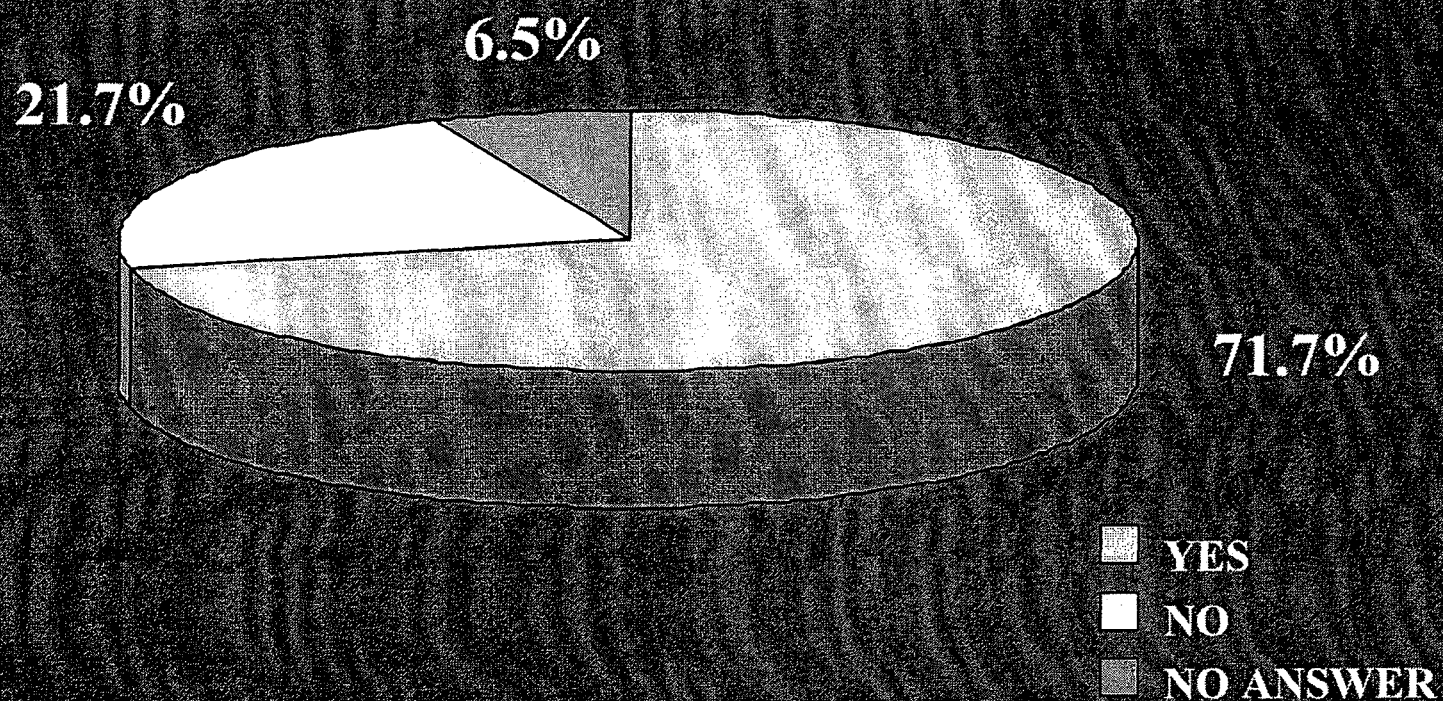
**1996 Survey of MGH physician experience with
narrative interpretations of complex laboratory
evaluations in coagulation**

**Ordering physicians sent a narrative
interpretation of one their own cases**

**Clinicians asked to respond to several
questions about the interpretation**

46 Of 100 surveys returned

THIS INTERPRETATION HELPED AVOID A MISDIAGNOSIS ?



**2000 Survey of MGH physician experience with
narrative interpretations of complex laboratory
evaluations in coagulation**

**Ordering physicians electronically sent a
narrative interpretation of one their own cases**

**Clinicians asked to respond electronically
to several questions about the interpretation**

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Interpretation Impact - Physician Outcomes

